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ABSTRACT

This research correlates maternal sociodemographic and psychological data and dimensions of maternal behavior at four and twelve months with dimensions of infant adjustment and competence at twelve months. Interviews of 321 low-income mothers were completed during the third trimester of pregnancy, at four months and at twelve months. Sociodemograhpic data and brief measures of maternal receptive vocabulary, locus of control, conforming values for children, and maternal attitudes toward interactions with the infant were collected during these interviews. Observations of maternal behavior during bathing, dressing, and play were collected at four and twelve months. Infants' behavior was rated after completion of the home visit on 31 items that had been compiled from observations of infant behavior. Maternal behavior dimensions of interaction/stimulation, acceptance vs. rejection, and consoling the crying infant that were insolated from factor analyses were correlated with infant behavior dimensions of receptive and expressive communication and of social and emotional behavior. Data analysis of 83 percent of the sample show that maternal sociodemographic and psychological characteristics and the maternal behavior dimension of interaction/stimulation are significantly correlated with one another and with infant receptive and expressive communication. These findings suggest that stable maternal behaviors and characteristics may have early, continuing and cumulative influence on the child's development. (Author/MP)

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Sociodemographic and Early Maternal Behavior Correlates of Infant Behavior at One Year

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ABSTRACT

This research correlates maternal sociodemographic and psychological data and dimensions of maternal behavior isolated from observations of bathing, dressing, and play at four and twelve months with dimensions of infant adjustment and competence at twelve months. Longitudinal data were collected during pregnancy, and on 83 percent of the sample of 321 women and infants at four months and at twelve months. Maternal behavior dimensions of interaction/stimulation, acceptance vs. rejection, and consoling the crying infant that were isolated from factor analyses were correlated with infant behavior dimensions of receptive and expressive communication and of social and emotional behavior.

Maternal sociodemographic data, psychological data on receptive vocabulary, internal locus of control, approval of interaction with baby, and self-directing vs. conforming values; and the maternal behavior dimension of interaction/stimulation were significantly correlated with infant receptive and expressive communication. Findings in previous studies that infant vocalizations predict later mental test scores suggest that maternal sociodemographic and psychological data and maternal interaction/stimulation may predict intellectual development of the infant. The findings were interpreted as identifying a pattern of modernity in child care that is related to the parent's sociodemographic characteristics and may contribute to the child's later academic achievement.

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of Infant Behavior at One Year

Introduction

The goal of this project is to isolate dimensions of infant behavior during mother-child interaction at one year, and to determine correlations of infant behavior dimensions with sociodemographic and psychological characteristics of the mother and with observations of dimensions of maternal behavior at four and twelve months. Earlier analyses of data from this project had identified major dimensions of maternal behavior and had identified sociodemographic and psychological characteristics of the mother that were correlated with maternal behavior (Schaefer, Bauman, Siegel, and Ingram, 1978; Siegel, Schaefer, Bauman, and Ingram, 1978). Findings of the earlier analyses and of the current analyses of antecedents and correlates of infant behavior will be integrated into a conceptual model for antecedents of infant behavior that might guide a process of screening for infants at risk and the design of interventions to influence infant development.

Subjects

The subjects were 321 low-income mothers and infants who were interviewed during pregnancy, received their prenatal care from a local health department and delivered at a community hospital. Follow-up home visits were completed for 83 percent of the sample at four months and at one year. Because of subject losses and incomplete maternal behavior observations during specific child care situations at four or twelve months, sample sizes in the reported analyses vary from 234 to 266.

Methods

Extensive interviews were completed during the third trimester of pregnancy, at four months, and at twelve months. Sociodemographic data and brief measures of maternal receptive vocabulary (Peabody Picture Vocabulary Test),

locus of control, conforming values for children (Kohn, 1969), and maternal attitudes toward interactions with the infant were collected during these interviews. Observations of maternal behavior during bathing, dressing, and play were collected at four and twelve months. Infants behavior was rated after completion of the home visit on thirty-one items that had been compiled from observations of infant behavior. Maternal and infant behavior were recorded by each of two persons who visited the home, with the data collector of the same race of the mother taking the initiative during the home visit.

Data Analyses

A principal component factor analysis with Varimax rotation was completed on the infant behavior ratings. Reliabilities of the combined factor scores for two observers were computed with the Spearman-Brown formula. Correlations were then computed between the infant behavior factor scores and maternal behavior at four months and at twelve months. Infant behavior factor scores were also correlated with sociodemographic variables of race, age of mother, education, and marital status and with maternal psychological characteristics of receptive vocabulary, locus of control, conforming values for children, and approval of high levels of interaction with the infant.

Results

Items with substantial factor loadings on the five factors of infant behavior are reported in Table 1. The first factor of receptive communication of the baby with mother indicates that the baby is attentive to the mother's behavior while the third factor of expressive communication with the mother emphasizes baby's vocalizations with the mother. The other three factors of low level of interaction; active positive expressive behavior; and irritable withdrawal from the mother appear to measure social and emotional response. Previous analyses of observational and rating methods for quantifying maternal behavior in this project found higher reliabilities for records of observations

immediately after specific child care situations than for ratings of typical maternal behavior during the entire home visit (Schaefer, et al., 1978). The relatively low Spearman-Brown correted reliabilities of Table 1 also suggest the need to record observations of these variables immediately after limited periods of observation or after specific child care episodes.

The maternal behavior factors that had been identified at one year are correlated with the infant behavior factors in Table 2 after converting the negative behavior factors into positive behavior scores. Maternal interaction/stimulation is significantly correlated with each of the infant behavior factors with the highest correlation with receptive communication ($r = .47$). This complex set of correlations suggest that both maternal and infant variables are descriptions of the mother-infant dyad rather than of the individual mother or infant (Strain and Vietze, 1975). Similarly the fact that a single maternal behavior dimension has significant correlations with two or more infant behavior factors suggests that the factors describe complex patterns of interaction rather than clearly differentiated dimensions of maternal or of infant behavior.

Maternal behaviors at four months are correlated with infant behaviors at one year in Table 3. The highest correlations are of maternal interaction/stimulation at four months with expressive and receptive communication of the infant at twelve months. Maternal acceptance versus rejection at four months is also positively correlated with infant interaction with mother at one year. The correlations of maternal behavior at four months with infant behavior at one year are much lower than the correlations between mother and infant factors when both are observed at the same time. This would support an interpretation that both the mother and infant factors partially describe changing interactions of the mother-infant dyad rather than stable behavior of the individual.

The question whether (1) maternal behavior is a response to the infant's characteristics or of infant-initiated interactions or (2) is related to stable characteristics of the mother had previously been explored by correlating maternal behavior with maternal psychological characteristics and sociodemographic variables (Siegel, et al., 1978). That analysis had isolated several maternal sociodemographic and psychological variables that are significantly correlated with maternal interaction/stimulation at four and/or twelve months. The infant behavior factors are correlated with those sociodemographic and psychological variables in Table 4. A pattern of highly significant correlations is seen between the maternal variables and infant receptive and expressive communication with somewhat lower correlations with the infant social and emotional behavior factors. Each of the psychological variables of maternal receptive vocabulary, internal locus of control, approval of interaction with the infant and disagreement with conforming values for the child are significantly correlated with both receptive and expressive communication of the infant. Of the lower correlations with sociodemographic variables, maternal education is most highly related to infant vocalization, i.e., expressive communication.

Discussion

The analysis suggests several different dimensions of infant behavior can be isolated from infant behavior ratings. Although analyses of reliability suggested the need to develop more reliable observational measures, the factor scores were significantly correlated with maternal behavior at one year and at a lower level with maternal behavior observations at four months. The hypothesis that behavior in the mother-infant dyad is related to stable maternal characteristics was supported by correlations of infant behavior with stable sociodemographic and psychological characteristics of the mother that are correlated significantly with maternal behavior. Findings of significant correlations of

stable maternal characteristics with the infant's receptive and expressive communication with the mother support an interpretation that maternal characteristics significantly influence both maternal behavior and infant behavior.

Maternal demographic and psychological characteristics that correlate with maternal and infant behavior are similar to a dimension of individual modernity that has been identified in cross-cultural research in developing countries (Inkeles and Smith, 1976). The correlations of maternal interaction/stimulation with those indices of individual modernity suggest that this dimension might be interpreted as a dimension of modernity in childrearing that fosters language skills needed in an academic, technological culture. Correlations between individual modernity and modernity in childrearing suggest a mechanism by which parents' educational and occupational achievements influence the intellectual development and academic achievement of their children.

Previous research on infant vocalization at one year has found that vocalizations are the most effective predictors of later intelligence test scores (Cameron, Livson, and Bayley, 1967; Catalono and McCarthy, 1954; Spiker and Irwin, 1949). The findings that maternal interaction/stimulation, sociodemographic characteristics, and psychological characteristics are significantly correlated with one another and with infant receptive and expressive communication suggest that stable maternal behaviors and characteristics may have early, continuing and cumulative influence on the child's development. These findings also suggest that infants at risk for less than optimal development might be identified through a combination of maternal sociodemographic and psychological variables as well as by patterns of maternal and infant behavior.

The Figure suggests a sequential process for screening for children at risk for developmental delay and possible points for intervention to influence child development. Demographic and maternal psychological characteristics that might be collected during pregnancy are correlated with maternal behavior

and infant behavior. Observations of maternal behavior during the first year of life provide additional evidence of the need for supportive services. After the first year of life, data on infant characteristics begin to contribute to the identification of children at risk. Substantial correlations of maternal characteristics (Broman, Nichols and Kennedy, 1975; Werner, Bierman and French, 1971) and insignificant correlations of infant characteristics (Sameroff, 1978) with later child development support a major focus on parent characteristics and parent-infant interaction both in screening for children at risk and in interventions designed to influence child development.

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Table 1

Selected Items with High Facto. Loadings, and Spearman-Brown Correlated Inter-Observer Reliabilities of Factors of Infant Behavior N=266

	Infant Behavior Factors	Spearman-Brown Corrected Reliabilities
Factor I.	Receptive Communication of Baby (B) with Mother (M)	.16
	When B is distressed, B seeks comfort from M. B looks to M for cues when uncertain or insecure. B responds to M as if B understands what M is saying. B seems to listen attentively to M when M is talking to B.	
Factor II.	Low Level of Interaction	.29
	B spends little time looking at M. B makes few attempts to elicit a response from M. B makes few attempts to interact with M. B pays little attention to M's presence or approach.	
Factor III.	Low Level of Expressive Communication	.70
	B's vocalizations to M are hesitant and/or weak. B's social response to M is slow and/or weak. B does not vocalize much to M.	
Factor IV.	Irritable Withdrawal	.59
	B is irritable in response to stimulation by M. B is restless or irritable in interaction with M. B tries to avoid or withdraw from contact with M.	
Factor V.	Active Expressive Positive Behavior	.20
	B often smiles at M. B is very active. B smiles, chuckles, or laughs aloud in response to M. B is very affectionate with M.	

Table 2

Correlations of Infant Behavior Factors with Maternal Behavior Observation Factors at One Year N=239

	Infant Behavior Factors				
Maternal Behavior Observation Factors	Receptive Communication	Interaction with M	Expressive Communication	Lack of Irritable Withdrawal	Active Positive Expressive Behavior
Interaction/Stimulation	.47****	.24****	.30****	.27****	.30****
Acceptance vs. Rejection	.19**	-.19**	.35****	.37****	-.06
Involvement	.25****	-.04	.42****	.04	-.11
Infant Affect Observation Factor					
Positive vs. Negative Affect of Infant	.09	.05	.09	.43****	.40****

* = .05
** = .01
*** = .001
**** = .0001

Table 3

Correlations of Infant Behavior Factors with Maternal Behavior Observation Factors at Four Months N=210

	Infant Behavior Factors				
Maternal Behavior Observation Factors	Receptive Communication	Interaction with M	Expressive Communication	Lack of Irritable Withdrawal	Active Positive Expressive Behavior
Interaction/Stimulation	+.27****	.14**	.23***	.13	.14*
Acceptance vs. Rejection	+.11	.22	-.01	-.08	.14
Consoling the Crying Infant	.00	-.13	.07	-.05	.04

* = .05
** = .01
*** = .001
**** = .0001

Table 4

Correlations of Infant Behavior Factors with Maternal Sociodemographic and Psychological Characteristics $N \geq 234$

	Infant Behavior Factors				
Maternal Sociodemographic Variables	Receptive Communication	Interaction with M	Expressive Communication	Lack of Irritable Withdrawal	Active Positive Expressive Behavior
Age	-.11**	.12**	.03	.17**	.09**
Marital Status: Not Single	.17*	.20	-.02	.16*	.17
Majority Group	.14	.12*	.12***	.13	.11
Years of Education	.11	.15	.22	.10	.06
Maternal Psychological Variables					
Receptive Vocabulary (PPVT)	.20***	.14*	.28***	.26***	.07
Internal Locus of Control	.19**	.11*	.31*	.03	.10
Approval of Interaction with Baby	.18***	.13**	.16***	.13*	.07
Conforming Values	-.23	-.16	-.21	-.14	-.11

* = $p<.05$
** = $p<.01$
*** = $p<.001$

Figure

A Model for Antecedents of Infant Behavior